

CLAIMS

1. A retroreflective device comprising a substantially spherical graded refractive index lens, a reflective part for retroreflecting a radiation beam
5 passing through the graded refractive index lens and, at least partially surrounding the lens, a non-gaseous transparent material having a substantially uniform refractive index.

2. A device according to claim 1, wherein said graded refractive
10 index lens has a gradually varying, spherically symmetric, refractive index distribution.

3. A device according to claim 2, wherein said refractive index distribution includes parts having at least two separate radial extents within
15 which the material of the lens has a continuously varying refractive index, the refractive index variation having a gradient discontinuity between said two radial extents.

4. A device according to any preceding claim, wherein said graded
20 refractive index lens has a refractive index at its centre which is greater than a refractive index at its outer surface.

5. A device according to any preceding claim, wherein said transparent material has a refractive index which is less than a refractive index of
25 said graded refractive index lens at its outer surface.

6. A device according to any preceding claim, wherein a ratio of the refractive index of said graded refractive index lens at its outer surface to a refractive index of said transparent material is between 1 and 2.

7. A device according to any preceding claim, wherein a ratio of the refractive index of said graded refractive index lens at its centre to a refractive index of said transparent material is between 1 and 2.

5 8. A device according to any preceding claim, wherein said transparent material surrounds at least approximately one half of the lens.

9. A device according to any preceding claim, wherein at least part of said transparent material is located between said graded refractive index lens and
10 the reflective part.

10. A device according to any preceding claim, wherein said reflective part includes a substantially spherical reflective surface arranged concentrically with respect to said graded refractive index lens.

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11. A device according to any preceding claim, wherein a boundary of the transparent material remote from said lens, and through which a radiation beam passes to be retroreflected, is defined by a substantially spherical transparent surface arranged concentrically with respect to the graded refractive
20 index lens.

12. A device according to claim 10 and 11, wherein said substantially spherical reflective surface and substantially spherical transparent surface have substantially the same radius of curvature.

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13. A device according to claim 10 and 11, wherein said substantially spherical reflective surface and substantially spherical transparent surface have different radii of curvature.

14. A device according to claim 13, wherein said substantially spherical reflective surface has a smaller radius of curvature than that of said substantially spherical transparent surface.

5 15. A device according to any of claims 1 to 10, wherein a boundary of the transparent material remote from said lens, and through which a radiation beam passes to be retroreflected, is defined by a substantially planar surface.

10 16. A device according to any preceding claim, wherein said transparent material comprises a solid moulded component.

17. A device according to any preceding claim, wherein said transparent material has a refractive index greater than 1.3.

15 18. A device according to any preceding claim, wherein said graded refractive index lens has a refractive index distribution which averages, across a radial cross-section, between 1.4 and 1.8.